Recognition and Predictability of Climate Variability within Southern Florida

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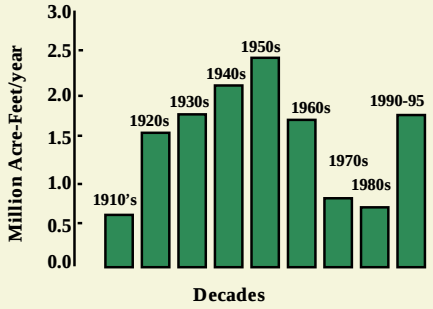
ABSTRACT

The increasing ability to understand and forecast regional climate anomalies is a valuable asset for water management authorities. To truly benefit from this increased understanding it is necessary to have a global perspective of the ocean and atmospheric systems that may affect a given region.

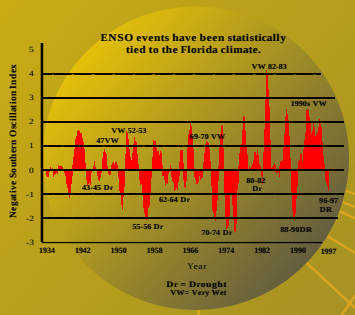
The statistical ties of Florida's winter climate to the El Nino-Southern Oscillation (ENSO) process has already been well documented. The purpose of this presentation is to report on additional factors, including solar activity and the strength of Atlantic Ocean Thermohaline current that appear to significantly contribute to climate variations in south - central Florida on seasonal to decadal scales. These various global factors are integrated and downscaled with the aid of artificial neural networks. While most previous studies have emphasized the statistical connection between Florida's climate and ENSO during the winter months, this effort explains a significant portion of the climate variability that occurs during the summer season.

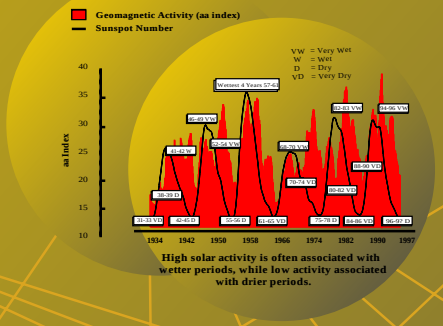
Decadal Variation of Lake Okeechobee Inflow



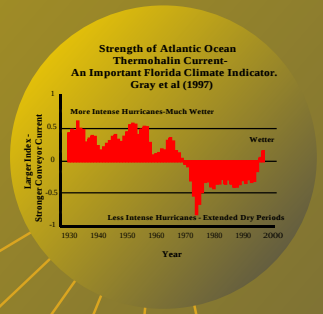
Lakes with large tributary basins are valuable indicators of climate variation. The Atlantic Ocean Thermohaline Current, ENSO, and the fluctuation of different types of Solar activity, including solar eruptive phenomena, appear to explain a large portion of South Florida climate variability.

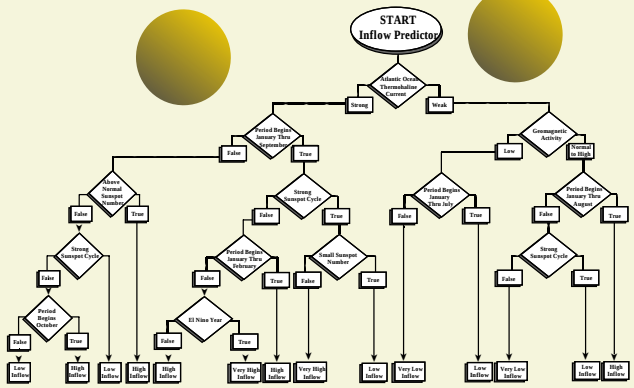
Artificial Neural Networks (ANN) are computational methods inspired by the study of the brain and nervous systems. Appealing aspects of neural networks are their ability to recognize patterns in complex non-linear processes. In this study we applied ANN to predict Lake Okeechobee Inflows from solar and global indices.



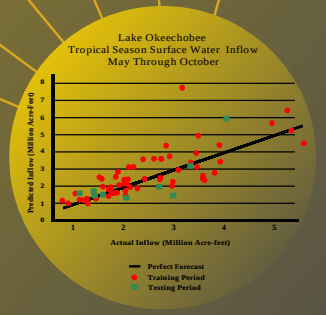


High solar activity is often associated with wetter periods, while low activity associated with drier periods.





A significant limitation of neural networks is that the representations they learn are incomprehensible to human. Craven and Shavlik (1997) developed a novel algorithm, TREPAN, for extracting comprehensible symbolic representation from trained neural networks. Dr. Craven of the Computer Science Department at Carnegie Mellon University [mark.craven@cs.cmu.edu; www.cs.cmu.edu/~craven] was kind enough to apply their algorithm to our Lake Okeechobee ANN inflow predictor. This application shed further light on the importance of various global and solar factors that influence Florida's climate.



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